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REMARKS

The present Response is submitted in reply to the Official Action of June 6, 2005.

Claims 12-22 are presently pending in the Application and the Examiner rejects claim 12, under 35 U.S.C. § 112, for informalities therein and claims 12-22 and in particular claims 12-22, under 35 U.S.C. § 112, as indefinite.

In response, the Applicant amended claim 12 herein above to address and overcome the informalities identified by the Examiner, and the Applicant accordingly respectfully requests that the Examiner reconsider and withdraw the objection to claim 12, under 35 U.S.C. § 112. The Applicant also amended claims 12 and 19-21 to address and overcome the Examiner's grounds for rejection of claims 12-22 as being indefinite, and the Applicant accordingly respectfully requests that the Examiner reconsider and withdraw the rejections of the claims, under 35 U.S.C. § 112, as indefinite.

It should be noted that the above described claim amendments did not add any new matter to the specification or claims, did not alter the subject matter or scope of the present invention, and are directed solely at overcoming the raised indefiniteness rejections and are not directed at distinguishing the present invention from the art of record in this case.

Next, and before discussing the rejections of the claims over the cited prior art, the Applicant reviewed the claims and the specification of the present Application in light of the informalities discussed herein above and noted that while certain aspects of the present invention are fully disclosed in the summary of the invention and in the claims, as originally filed, those aspects of the invention are not explicitly included in the description of the invention itself in the specification. Therefore, and while the summary of the invention and the claims are held to be a part of the disclosure, in the same manner as an equivalent to the specification and drawings, the Applicant herein above submits an amendment to the specification to bring the specification into the standard, conventional and formal format and, more specifically, elected to do so by incorporating the material from the summary of the invention and the claims into the specification as a new paragraph [022].

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It should be noted that the above described amendments to the specification do not add any new matter to the specification or claims, do not alter the subject matter or scope of the present invention, and are not directed at distinguishing the present invention from the art of record in this case but are instead submitted solely to remedy informalities in the specification.

Next, the Examiner rejects claims 12, 13, 17-22, under 35 U.S.C. § 102(e), as being anticipated by Varela et al. '655 and supported by Tanzer et al. '005, claims 14 and 16 under 35 U.S.C. § 103(a) over Varela et al. '655 in view of Tanzer et al. '005, and claim 15 under 35 U.S.C. § 103(a) over Varela et al. '655 in view of Tanzer et al. '005 further in view of Singer '531. The Applicant acknowledges and respectfully traverses all of the raised rejections in view of the following remarks.

First, it must be noted that after due consideration of the prior art cited by the Examiner, the Applicant amended claim 12 herein above by incorporation of the subject matter and recitations of claims 14 and 15 into claim 12. The remaining claims, that is, claims 13 and 16-22, are all dependent from claim 12 and thereby incorporate by dependency all of the recitations and limitations of claim 12 as amended herein above.

Therefore, now considering the present invention as recited in claim 12 as amended herein above, the present invention is directed to a gantry axle that includes a driven differential gear unit which is connected with each vehicle wheel through an axle shaft 1 and a respective gantry transmission wherein each wheel is rotatable around an axis of rotation 12 of the vehicle wheel and rests on the ground 11. According to the present invention, each gantry transmission has an input spur gear 2 driven by the axle shaft 1 and operatively connected with a first intermediate spur gear 3. The first intermediate spur gear 3 is, in turn, non-rotatably connected with a second intermediate spur gear 4 and both of the intermediate spur gears 3, 4 rotate around an axis of rotation 9 of the intermediate spur gears 3, 4. The second intermediate spur gear 4 is operatively connected with an output spur gear 5 which is, in turn, connected with the vehicle wheel and which rotates around the axis of rotation 12 of the vehicle wheel.

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According to the present invention, the vertical spacing 15 between the axis of rotation 10 of the input spur gear 2 and the ground 11 is smaller than the vertical spacing 17 between the axis of rotation 9 of the intermediate spur gears 3, 4 and the ground 11, and is smaller than the vertical spacing 18 between the axis of rotation 12 of the output gear 5 and the ground 11.

Further according to the present invention, the input, intermediate and output spur gears 2, 3, 4, 5 of the gantry transmission have helical cut teeth and a sloping angle of the helical cut teeth of the first and of the second intermediate spur gears 3, 4 are designed so that the axial forces of the first and of the second intermediate spur gears 3, 4 are substantially neutralized.

Therefore, considering the prior art cited by the Examiner in the rejection of claims 12, 13, 17-22 before amendment herein above, the Examiner cites Tanzer et al. '005 as showing a differential gear unit and Varela et al. '655 as showing a gantry transmission having an input spur gear 2 driven by the axle shaft 1 and connected with a first intermediate spur gear 3 that is on a common axis of rotation with a second intermediate spur gear 4 wherein second intermediate spur gear 4 is, in turn, operatively connected with an output spur gear 5. The Examiner further cites Varela et al. '655 as showing the general vertical and horizontal spacing of the axes of rotation of the input spur gear, of the first and second intermediate spur gears, and of the output spur gear that are employed in the present invention.

For purposes of the following discussions, and solely for purposes of the following discussions and without any admission or concession regarding the relevance of teachings of the cited prior art with regard to the present invention, the Applicant will not herein dispute the Examiner's interpretation of the teachings of Varela et al. '655 and Tanzer et al. '005 in so far as those teachings are generally stated above and in so far as those teachings apply to claims 12, 13 and 17-22 before amendment herein above.

Next, considering the rejection of claims 14 and 16 under 35 U.S.C. § 103(a) over Varela et al. '655 in view of Tanzer et al. '005 before the above submitted amendments to the

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claims, also the Examiner does not explicitly repeat the citation of Varela et al. '655 for the teachings cited in the rejection of claims 12, 13 and 17-22, it is assumed by the Applicant that the Examiner implicitly includes the above discussed teachings of Varela et al. '655 in the rejection of claims 14 and 16.

The primary focus of the Examiner's rejection of claims 14 and 16, however, is the teachings of Tanzer et al. '005 which the Examiner cites a teachings a differential unit, an axle shaft, a gantry transmission, and a vehicle wheel attached to the output shaft of the gantry transmission. In particular, however, the Examiner cites Tanzer et al. '005 as showing a gantry transmission having an input spur gear on the input shaft and driving an output spur gear on the output shaft wherein the input spur gear is vertically closer to the ground than the output spur gear and output shaft. The Applicant does not dispute the Examiner's interpretation of the teachings of Tanzer et al. '005 in so far as stated above.

The Examiner further states, however, that Varela et al. '655 does not teach or suggest the use of helical cut teeth in the gantry transmission, which is the subject matter of claim 14 which is now incorporated into claim 12 by the amendments herein above and therefore is incorporated by dependency into all of the present claims. The Examiner continues by stating, however, that at column 2, lines 63-64, Tanzer et al. '005 teaches the use of helical cut teeth to provide a high contact ratio and that it would be obvious to incorporate the helical cut teeth of Tanzer et al. '005 into the teachings of Varela et al. '655, thereby teaching the recitations of claim 14.

The Applicant respectfully disagrees with the Examiner's interpretation of the teachings of Tanzer et al. '005 and Varela et al. '655 as regards the use of helical cut teeth in a gantry transmission of the general configuration suggested by Varela et al. '655 and used in the present invention as recited in amended claim 12 for a number of fundamental reasons.

For example, the gantry transmission of the present invention as recited in amended claim 12, like the gantry transmission of Varela et al. '655, employs first and second intermediate spur gears located on a common axle and connected the input spur gear, and thus

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the input shaft, to the output spur gear, and thus the output shaft. The spur gear arrangement of the gantry transmission of the present invention and of Varela et al. '655 thereby distributes the forces transmitted through the gantry transmission and the gear ratios of the gantry transmission between two stages, that is, between the input spur gear and the first intermediate spur gear and then between the second intermediate spur gear and the output spur gear.

In complete contrast from the present invention as recited in claim 12 and as shown in Varela et al. '655, the gantry transmission taught by Tanzer et al. '005 does not employ and does not include any form of intermediate spur gears and the input spur gear instead drives the output spur gear directly. As such, and in a fundamental difference between the spur gear arrangement of the present invention and of Varela et al. '655, the input and output spur gears of the Tanzer et al. '005 gantry transmission must deal with the forces transmitted through the transmission and the gear ratio through the transmission in a single step.

It will be appreciated by those of skill in the relevant arts that the requirements imposed on the various spur gear gears of the present invention and of Varela et al. '655 are fundamentally different in kind and magnitude than those imposed on the single stage spur gears of the Tanzer et al. '005 gantry transmission.

These basic differences are further illustrated by the teachings of the present Application as compared to the teachings of Tanzer et al. '005. For example, at column 2, lines 63-64, as cited by the Examiner, Tanzer et al. '005 states that "[p]referably the teeth of pinion 76 and gear 82 are high contact ratio teeth, either helical or spur gear teeth". In other words, Tanzer et al. '005 teaches that the primary criteria is that the spur and gear teeth be high ratio teeth and whether they are helical teeth or spur teeth, which are fundamentally different from helical teeth, is essentially immaterial. As such, Tanzer et al. '005 does actually not teach the use of helical teeth in particular, but instead essentially teaches the use of high contact ratio teeth of any form.

It must also be noted that this conclusion is further supported in that because the Tanzer et al. '005 gantry transmission uses only a single stage of gearing between the input

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and output shafts, the teeth of the gears and spur must carry notably higher pressures and forces and must be cut to significantly different gear ratios than the teeth of the spur gears in the two gearing stage arrangement of present invention and in Varela et al. '655.

Considering by comparison the teachings in the present Application, the specification states at paragraph [012] that "[t]he toothing of the gantry transmission is preferably designed as a helical toothing, the toothing of the first and of the second intermediate spur gears being designed so that the axial forces of the first and of the second intermediate spur gears become almost neutralized." Stated another way, the use of helical teeth in the gantry transmission of the present invention is directed to an entirely different problem than in Tanzer et al. '005, that is, to reducing and preferably neutralizing the axial forces in the spur gears, rather than providing greater tooth area to carry greater torque through a single stage gearing. In this regard, it should be noted that paragraph [021] of the specification indicates that the use of intermediate spur gears in the gantry transmission of the present invention reduces the torque levels through, for example, the differential transmission, and thus through the gantry transmission, thereby allowing spur gears of smaller diameter and that carry less torque, thereby improving the ground clearance dimensions of the gantry transmission.

In summary, therefore, Tanzer et al. '005 does not actually teach the use of helical gear teeth, but actually teaches the use of gear teeth having greater contact area and thus able to carry greater loads, of which helical teeth or merely one exemplary type of gear teeth having greater contact area.

In addition, it must be noted that the present invention as recited in amended claim 12, which now incorporates the recitations of claim 14, is fundamentally distinguished from Tanzer et al. '005 because Tanzer et al. '005 suggests the use of helical tooth gears in a gantry transmission having only a single stage of gearing, that is, wherein the input spur gear and shaft drives the output spur gear and shaft directly. In contrast, the gantry transmission of the present invention as recited in amended claim 12, and as shown in Varela et al. '655, employs a two stage gearing where the first and second intermediate spur gears on an intermediate

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shaft are interposed between the input spur gear and shaft and the output spur gear and shaft. As a consequence, the gearing requirements and geometries of the present invention, and of Varela et al. '655, are fundamentally different from those of Tanzer et al. '005, so that Tanzer et al. '005 is not, in fact, relevant to the present invention or to Varela et al. '655, so that would not be obvious to combine the teachings of Tanzer et al. '005 with those of Varela et al. '655.

It is, therefore, the belief of the Applicant that the recitations of claim 14 as originally dependent from claim 12 and the recitations of amended claim 12 which now include the recitations of original claim 14 are fully and patentably distinguished over and from the teachings of Tanzer et al. '005 and of Varela et al. '655 in view of Tanzer et al. '005 under the requirements and provisions of 35 U.S.C. § 103 for the reasons discussed above. The Applicant, therefore, respectfully requests that the Examiner reconsider and withdraw all rejections of the claims under 35 U.S.C. § 103 over Varela et al. '655 in view of Tanzer et al. '005.

Finally considering the rejection of claim 15 under 35 U.S.C. § 103(a) over Varela et al. '655 in view of Tanzer et al. '005 further in view of Singer '531, it must first be noted that the recitations of claim 15 are incorporated into independent claim 12 by amendments herein above, as were the recitations and limitations of claim 14. The recitations of amended claim 12, therefore, now include the recitations and limitations of original claims 14 and 15, which are now incorporated into all of the remaining claims by dependency from claim 12.

First considering the teachings of Varela et al. '655 in view of Tanzer et al. '005 with respect to claim 15 and with respect to amended claim 12, which now incorporates the limitations of both claim 14 and claim 15, it is the belief that claim 15 and claim 12 as amended herein above are patentably distinguished over and from the teachings of Varela et al. '655 in view of Tanzer et al. '005 for the reasons discussed above.

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Therefore considering the teachings of Singer '531, the Examiner cites Singer '531, and in particular at column 3, lines 59-68 of Singer '531, as teaching sloping the angle of the gear teeth of the intermediate gears so that the axial forces of the intermediate spur gears are substantially neutralized.

The Applicant respectfully disagrees with the Examiner for the reasons, noting that the specific recitation from the present Application is that "a sloping angle of the helical cut teeth of the first and of the second intermediate spur gears (3, 4) are designed so that the axial forces of the first and of the second intermediate spur gears (3, 4) are substantially neutralized".

Referring first to the Examiner's specific citation of column 3, lines 59-68, in Singer '531, this reference therein describes that the intermeshing teeth of the gearing between the input and output shafts are slightly misaligned when the vehicle is at less than full load and that this misalignment of the gear teeth is due to misalignment of the input and output axes. Singer '531 further states that as the vehicle approaches full load the misalignment of the gearing teeth decreases, as does the misalignment angle between the input and output axes, so that the stresses in the axes is reduced without causing excessive wear on the gears.

It is, therefore, necessary to note certain fundamental distinctions between the present invention and the teachings of Singer '531.

For example, and as also discussed above with regard to Tanzer et al. '005, the Singer '531 does not even have intermediate gears of any form. In addition, the Singer '531 gantry transmission does not even have spur gears; the input axle instead drives a pinion gear which, in turn, engages the teeth on the inner circumference of a ring gear mounted on the output axle. As discussed above with regard to Tanzer et al. '005, therefore, the gearing requirements and geometries of Singer '531 are therefore fundamentally different from those of the present invention, so that it would not be obvious to combine the teachings of Singer '531 with the present invention or with the teachings of Varela et al. '655 and so that the teachings of Singer '531 are in fact irrelevant to the present invention.

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In further distinction between the present invention and Singer '531, it must also be noted that the present invention recites that cutting the helical teeth of the spur gears at an angle will reduce the axial stresses in the spur gear. In basic contrast, Singer '531 merely states that having the input and output axles and thus having the teeth of the pinion and ring gears at a slight angle will not cause excessive wear in the pinion and ring gears, which is an entirely different matter from reducing axial stress in the gears.

In addition, and in complete and fundamental distinction between the present invention and Singer '531, it must be noted that Singer '531 does not in fact suggest sloping the angle of the gear teeth themselves. The relevant portions of the Singer '531 specification, which actually extends from column 3, line 19 through column 4, line 38 instead of only column 3, lines 59-68, instead describes sloping the relative angle between the input and output shafts at low load levels to thereby pre-stress the axles so that the full load stress on the axles is reduced by being offset by the pre-stressing when the vehicle is at full load. More specifically, Singer '531 describes that the input shaft 22 from the differential enters the gantry transmission housing through a faceplate 18 that, on its opposite side, mates with a gear casing 26 through which the output axle 32 to the vehicle wheel exits the gantry transmission. The mounting face between the faceplate 18 and the gear casing 26 is defined by a mounting flange 40 having a smooth face 40a and Singer '531 describes shaving the face 40a of the mounting flange 40 so that axles 22 and 32 are not parallel but are "slightly angularly misaligned" when the vehicle is not at full load, thereby "pre-stressing" the axles. The angle between the input and output shafts decreases as the vehicle load increases, which increases the stresses on the axles, until the input and output shafts are essentially parallel at maximum load. The stresses on the axles at full load are decreased, however, because the full load stresses are offset by the pre-stressing at lower load levels.

As a result and in complete contrast from the present invention, Singer '531 does not in fact teach or suggest cutting the teeth of the gears at an angle, but instead explicitly teaches misaligning the input and output axles of the gantry transmission by imposing an angle on

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meeting faces of the parts of the transmission casing that support the input and output axles. As a result, it is very clear that any angle between the teeth of the gears is not due to cutting the teeth of the gears at a slope or angle, but is instead due solely to a misalignment angle between the input and output axles of the gantry transmission.

It is, therefore, the belief and position of the Applicant that the relevant portions of the recitations of claim 12 that are incorporated into claim 11, from claim 15, and thus into the remaining claims by dependency, are fully and fundamentally distinguished over and from the teachings and suggestions of Singer '531 under the requirements and provisions of 35 U.S.C. § 103 for the reasons discussed above.

In addition, it is the belief and position of the Applicant that it would not be apparent to one of ordinary skill in the relevant arts to combine the teachings of Singer '531 with the teachings of Varela et al. '655 for the same reasons, discussed above, that it would not occur to one of skill in the arts to combine Tanzer et al. '005 with Varela et al. '655. More specifically, the gantry transmission of the present invention and the Varela et al. '655 gantry transmission both employ intermediate gears between the input and output gears while Tanzer et al. '005 and Singer '0531 have not intermediate gears but instead drive the output gear directly with the input gear.

It is, therefore, the belief and position of the Applicant that Varela et al. '655 in view of Tanzer et al. '005 further in view of Singer '531 is not a valid combination of art under the requirements and provisions of 35 U.S.C. § 103 and does not teach or suggest the recitations of claim 15, and the equivalent recitations of claim 12, under the requirements and provisions of 35 U.S.C. § 103.

It is, therefore, the belief of the Applicant that the recitations of claim 15 as originally dependent from claim 12 and the recitations of amended claim 12 which now include the recitations of original claim 15 are fully and patentably distinguished over and from the teachings of Varela et al. '655 in view of Tanzer et al. '005 further in view of Singer '531 under the requirements and provisions of 35 U.S.C. § 103 for the reasons discussed above.

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The Applicant therefore respectfully requests that the Examiner reconsider and withdraw all rejections of the claims under 35 U.S.C. § 103 over Varela et al. '655 in view of Tanzer et al. '005 further in view of Singer '531.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Varela et al. '655, Tanzer et al. '005 and/or Singer '531 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

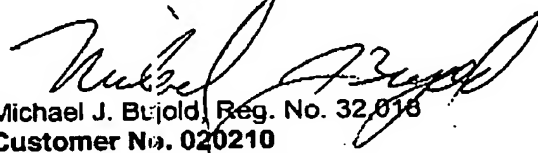
In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

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Respectfully submitted,



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